

TRIUMF — A System for Remote Multimedia Interviewing

M. Kiddell[§], M. Chen[§], D. J. Osborne[†], F. W. Slater[‡] and M. McCulloch[†]

[§] *Department of Computer Science,* [†] *Department of Psychology and* [‡] *Careers Centre*
University of Wales Swansea, Singleton Park,
Swansea SA2 8PP, United Kingdom
{m.kiddell, m.chen, d.j.oborne, f.w.slater, m.mcculloch}@swansea.ac.uk

Abstract

Modern communication technologies enable recruitment interviews to be held remotely through the use of video conferencing. However, the effective deployment of such services, at a standard comparable to traditional face-to-face interviews, requires an integrated hardware and software environment to support a wide range of activities during recruitment interviews. In this paper, we present a system for such an environment, and demonstrate how multimedia communications are managed in the environment and how they can be used to assist the interviews in ways that would not be easily achievable in traditional face-to-face interviews.

1. Introduction

The rapid development of network communication technology has made it feasible for recruitment interviews to be held remotely through the use of video conferencing [1]. The availability of such technology-based services is having a fundamental impact upon industry and commerce, which are continuously seeking more efficient and cost-effective ways in their recruitment selection process. Meanwhile organisations such as careers centres and employment services will inevitably equip themselves with the new technology in order to maximise the employment opportunities of their clients.

The University of Wales Swansea is one of the pioneer institutions that has been actively involved in developing and implementing the concept of *Virtual Careers Centres (VCC)* in Wales and the UK. Among many VCC projects conducted at Swansea, an interdisciplinary project¹ is currently being carried out. Its overall aim is to study human factors aspects of VCC, develop generalisable system solutions to the multimedia communications in

VCC, and assist in the creation of new products for VCC — a new market for the emerging information highway.

This paper describes a system specially designed for remote interviews. In Section 2, we will introduce the concept of *Remote Multimedia Interviewing (RMI)*, and outline the system requirements from both the users' and developers' viewpoints. In Section 3, we present an integrated software environment — TRIUMF (Technology-based Remote Interviews Under a Multimedia Framework). This is followed with discussions on the methodologies used to design TRIUMF's multimedia user interface in Section 4. We conclude the paper with our observations and plans for further development in Section 5.

2. Remote Multimedia Interviewing

It is known that standard video conference systems do not provide the same feeling of presence as would be achieved in face-to-face interviews [2]. To overcome this drawback, it has to be identified what aspects of the interview are missing. These may include a lack of physical contact (e.g. the handshake), data exchanges (such as passing around documents, filling in forms, and taking psychometrics tests), and perception of eye contact between parties (critical in face-to-face interviews). It is therefore essential for remote interviews over computer networks to support a range of *multimedia* communications to help overcome these problems. We denote the term *Remote Multimedia Interviewing (RMI)* to mean such interview processes in the context of recruitment selection or careers advisory services. A special purpose system is very much desirable for RMI. The hosts of such a system may include large-to-medium sized companies, universities and colleges, government employment services, recruitment agencies, and other reasonably sized organisations. The typical users will include job seekers in all walks of life, recruitment selectors such as managers, personnel officers, and career advisers.

¹ The project reported in this paper is supported by UK EPSRC as a part of its Multimedia and Networking Application (MNA) Programme.

Our requirements analysis has identified a comprehensive set of features that are desirable to these hosts and their users. Some of them are:

1. The system should be based on popular PC hardware. It should support standard protocols for visual, audio and data communications, and a range of common network architectures.
2. The system should support multiple cameras wherever possible [3]. In a face-to-face interview, an interviewee's actions, such as walking into room and sitting on a chair, always affect interviewers' assessment to a certain degree. In some situations (e.g. recruiting a salesperson), such actions may be critical. It is therefore essential for the system to provide a number of views of the interview room as well as adequate views of an interviewee.
3. The human computer interaction (HCI) for interviewees should be designed to suit novice computer users, for example, with simple and intuitive controls and through a touch screen.
4. The HCI for interviewers should focus on the activities in RMI instead of its technical aspects. This requirement will be addressed in detail in Section 4.
5. Interview rooms should be ergonomically designed for RMI.
6. The system should allow users, sometimes perhaps through a technician, to exercise controls over video communication, including speed, resolution, viewing windows, number of views and viewing angles and distances.
7. The system should also provide controls over audio communications in a similar manner.
8. The system should facilitate structured data communications, such as form filling and psychometrics tests, as well as unstructured data communications such as sharing a white-board or a spreadsheet. Although their use must be carefully managed according to the IT experience, or expected experience, of a candidate, such facilities will gradually become more acceptable in RMI.
9. The system should provide online, procedural as well as technical, guidance to interviewees, interviewers and careers advisers.
10. The system should provide tools for personnel data management or online record keeping, and/or a seamless link to personnel databases. With the continuing decrease in the cost of storage space, the recording of multimedia communications in RMI can become a practice in recruitment selection.
11. The system should also provide some functions to overcome the lack of physical contacts in RMI. Experienced interviewers often utilise physical contacts (e.g. hand-shaking), and prepared or spontaneous actions (e.g. drawing a curtain, passing a

document) to put an interviewee more at ease and reduce tension. A well-designed set of software utilities may be used to achieve the same effect.

12. The availability of computer-based multimedia communications also provides an interview process with a new dimension. The system should support activities such as playing a video tape, and conducting a multimedia psychometrics test.

The system could also support many other computer-based activities, such as an auto-cue utility for interviewers. It has also been suggested that the system could be equipped with online facilities for processing multimedia information, from monitoring the length of silence to quantifying the amount of body movement. Such facilities could be used to assist interviewers in assessing candidates in a more objective manner, though the ethics of using such facilities must be researched into before they are employed in real interviews.

3. Software Architecture

The development of TRIUMF (Technology-based Remote Interviews Under a Multimedia Framework) is the main focus of the project described in this paper. TRIUMF is an integrated software environment that facilitates RMI communications in different media, supports a range of interview techniques, and is equipped with facilities for managing RMI sessions and procedures.

As illustrated in Figure 1, through a coherent multimedia user interface, TRIUMF provides the user with three groups of tools, namely *interview*, *system* and *data management*.

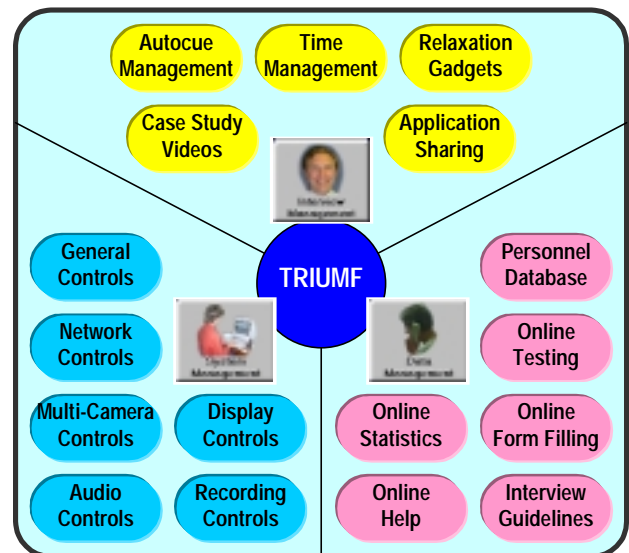


Figure 1. Software architecture of TRIUMF.

3.1 Interview Management

This group of tools is used by interviewers to manage an interview session, and enables them to utilise some computer-based interview techniques selected from a collection of online activities. The tools are:

Auto-cue Management. This can be used as a notepad that stores pages for each stage of an interview session (e.g. a reminder to do something before playing a video to a candidate).

Time Management. This tool is used to assist interviewers in managing their schedules and devising plans for each session and its stages (e.g. introduction, job-based discussions, personality, testing, etc.). It can also signal over-runs in schedules and provide links to the Auto Cue.

Relaxation Gadgets. This tool provides a collection of activities that are designed to introduce a “human-touch” into RMI, and to compensate for the absence of physical contact. For example, for a computer-illiterate interviewee, the interviewer may activate a huge clown face on the interviewee’s computer screen, and ask him/her to press the clown’s nose. This is then followed by some light-hearted response before the display changes back to the normal user interface. Such an activity can make the interviewee feel at ease with the computer and build a rapport between two sites.

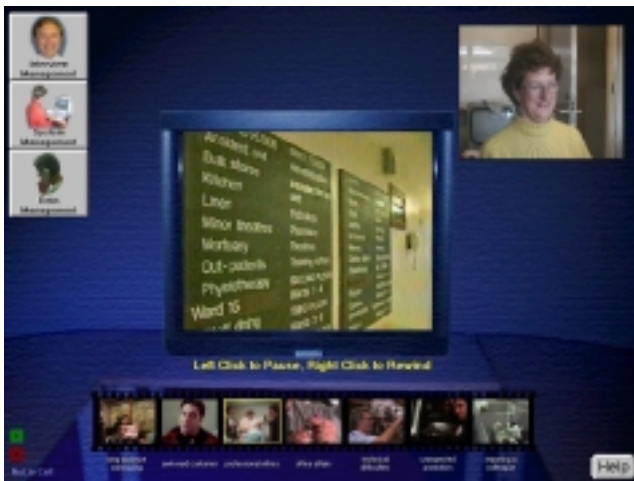


Figure 2. TRIUMF Video Case Studies

Case Study Videos. Case studies are typical interview techniques commonly used in face-to-face interviews. For instance, an interviewee may first be given a short story, and then asked about his/her possible reaction if they found themselves in a similar situation. To maintain consistency, an interviewer often has to recite the same story to many interviewees. TRIUMF provides a more efficient and effective alternative by allowing an interviewer to play a short case-study video on the interviewee’s screen, as illustrated in Figure 2. A number

of standard case studies are provided, each accompanied by a list of suggested questions.

Application Sharing. This tool facilitates the sharing of common applications such as a white-board, a word processor and a spreadsheet.

3.2 System Management

This group of tools is mainly used to assist in the management and customisation of TRIUMF environment. Most of these tools are designed to be used by technically-experienced interviewers or designated technicians. Each tool is essentially a set of controls for a certain class of system parameters. Many parameters at an interviewee’s site can be remotely controlled through the computer at the interviewer’s site. Examples of each class are:

General Controls — customisation of TRIUMF Desktop, software compatibility, and other general software preferences.

Network Controls — site connection and disconnection, protocol selection, and bandwidth allocation.

Multi-Camera Controls — camera activation and deactivation, zooming, and head-tracking.

Display Controls — selection of camera views, size and position of view windows, video filters (e.g. brightness, contrast), frame rate and resolution.

Audio Controls — microphone activation and deactivation, audio quality, volume, duplexity and echo cancellation.

Recording Controls — selection of recording devices (e.g. external VCR, disk), and selection of visual channels (e.g. a particular view, screen).

3.3 Data Management

Facilities for data management and record keeping are commonly available in Computer-Aided Telephone Interviewing (CATI) systems [4], but rare in general purpose video conferencing environments. In view of the importance of data management and record keeping in a recruitment selection process, it is highly desirable to equip TRIUMF with such facilities. However data management in RMI is far more complex in comparison with a CATI system. Firstly a CATI system is normally designed for a specific group of users, for example, staff in a call centre, while RMI users are more diverse in terms their professions and IT knowledge. Secondly, data to be recorded in a CATI system includes typically telephone conversation and its transcriptions; and data to be accessed includes database entries activated by a telephone number or a postcode. However, data to be managed in RMI substantially exceeds that in CATI in both quantity and

complexity. This shall become more obvious when we examine the data management tools in TRIUMF.

Personnel Database. TRIUMF provides a seamless connection to a predefined database management system (DBMS) with a predefined template for personnel databases. The link to other DBMS' can also be specified, through there is no direct data exchange between TRIUMF and such a DBMS.

Online Form Filling. This tool facilitates the completion of a form during an RMI. During this process, the electronic form is displayed on the computers at both sites, and data can be entered from either site depending on the nature of this process and the background of the interviewee.

Online Testing. This tool enables a test to be carried out during an interview. To maintain the generality, the contents of a test is defined in HTML and the test is conducted through a Web browser. With HTML, multimedia contents of a test, such as text, images, sound and video, can easily be constructed through a HTML editor or a word-processor with HTML capability. Such contents can be communicated to the interviewee through a Web browser in a standard manner.

Online Statistics. As mentioned in Section 2, it is technically feasible for TRIUMF to provide some online statistics to interviewers, though the ethics of this facility are yet to be investigated by experts in the relevant fields. This tool is developed as research component of TRIUMF in order to study the usefulness of such a facility. Examples of statistical results that are compiled at the end of each session include:

- the ration of length of silence to that of the session,
- the ratio of the speaking time between the interviewee and interviewer,
- minimum, maximum and average volume of the interviewee's speech,
- the amount of body movement through a particular camera view (represented by the average frame difference).

Online Help. User manuals, and indexed help messages.

Interview Guidelines. Guidelines to interviewees, interviewers and career advisers on social aspects of RMI to inform the users of the significant differences between face-to-face interviews and RMIs, the potential disadvantages that may lead to an unfair decision, codes of conduct, and methods for effective preparation of an RMI interview.

3.4 Implementation Environment

Due to the variety of hardware and software involved, the development environment of TRIUMF is not as uniform as one would desire. As illustrated in Figure 3, there are a

number of programming languages, APIs, development tools, and external software systems. The links between these development tools and TRIUMF components are also indicated in the figure.

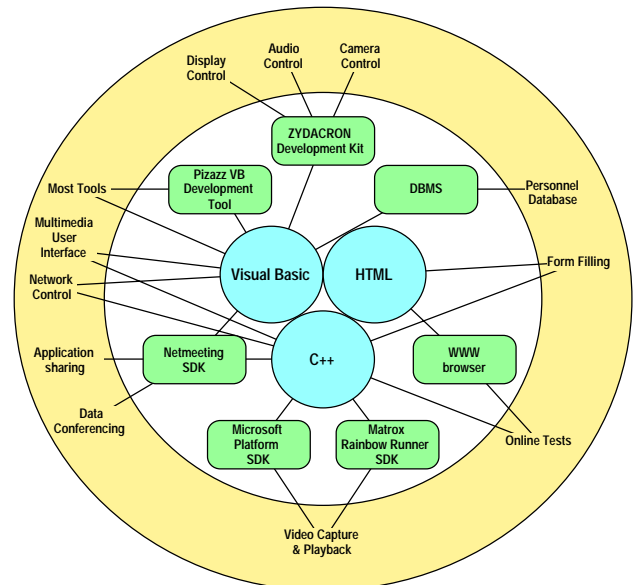


Figure 3. Development environment of TRIUMF.

4. Multimedia User Interface Design

4.1 Human Centred User Interface

Most of the existing tools, designed for video/audio conferencing, data exchanging, on-line chat and application sharing, are equipped with a user interface to suit their functionality. Nevertheless, most of such user interfaces are designed for IT personnel, and it is impossible to expect interviewers and interviewees to juggle these tools during an RMI session. Previous projects at Swansea on recruitment systems based on the multimedia communication technology [5] highlighted the necessity of providing users with a coherent multimedia user interface that hides the complexity of the underlying technology from users. The design of a multimedia user interface for TRIUMF thereby becomes a critical issue in this project.

The TRIUMF user interface is designed with an emphasis on a human-centred approach, which places its emphasis on the user purpose and participation rather than the mechanism [6, 7]. For example, instead of presenting an interviewee with available communication tools, the user interface may show what can be seen, heard and read at both sites, and what can be used to write and draw.

TRIUMF has two entirely different user interfaces for interviewees and interviewers respectively. Our design principles are to provide interviewees with an extremely

simple user interface, and interviewers with an intuitive user interface reflecting the face-to-face interview process, at the same time we must not neglect the fact that technicians also need to configure the system.

4.2 TRIUMF User Interface for Interviewees

TRIUMF provides interviewees with a touch screen that facilitates intuitive human computer interaction. The top-level display contains four large buttons for

- reading online guidance to interviewees,
- getting online help,
- calling for technical assistance,
- helping myself (the interviewee) with controls.

The interviewees are given very limited options; there is not even an “exit” button. All facilities for system management and data management are hidden under the last two buttons.

4.3 TRIUMF User Interface for Interviewers

On the other hand, TRIUMF provides interviewers with a different style of user interface that provides a range of tools as described in Section 3. Figure 4 shows the top-level display of this interface. Since it is assumed that all RMI interviewers and technicians will have some IT experience, a button icon is perhaps the most intuitive metaphor for entering a lower level of interactions. The three buttons at the top-left corner allow the access to all tools for interview, system and data management. The display of buttons below the video window is



Figure 4. TRIUMF top level screen for interviewers.

customisable, and buttons are normally selected to suit an interview process.

5. Conclusions

We have described a research project on RMI in the context of recruitment selection and career advisory services. We have noted the deficiencies of using general-purpose video conferencing environments for RMI. The development of TRIUMF has shown that many of such deficiencies can be overcome through a purposely-designed RMI system. In addition, such a system can offer many multimedia interviewing techniques, which are absent in traditional face-to-face interviews.

We are continuing our development of TRIUMF in areas of hardware configurations and software tools, and expect to develop a system that overcomes many of the problems associated with video-mediated interviews. We will also conduct some cognitive studies on the usability of the TRIUMF user interface, and carry out more interview experiments.

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